wantfa
Pioneers and Leaders in Conservation Agriculture
Western Australian No-Tillage Farmers Association

# CARBON NEWS Issue 4

## Welcome to the November edition!

Many of you who make up the farmer audience are probably in the midst of harvest at the moment, we would like to wish you all the best for harvest and we hope this edition of Carbon News will provide much food for thought during those long hours on the header.

## How can we carbon farm at harvest?

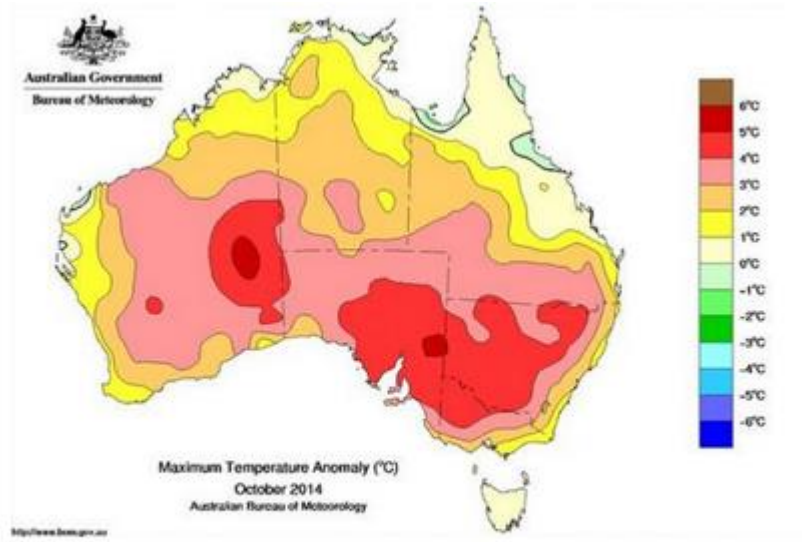
The easiest and best things you can do to be a 'carbon farmer' at harvest time are:

1. Harvest your crop with the most efficient use of fuel and machinery. This will help to save costs and carbon emissions from burning diesel.
2. Graze your remaining stubbles efficiently! Overgrazing can lead to erosion and loss of soil carbon by removing plant material and soil cover and accelerating organic matter breakdown.
3. Be bush fire ready… Uncontrolled bush fires can be a huge source of carbon emissions (mainly carbon dioxide and methane) to the atmosphere. With this summer expected to be a major bush fire season, please be prepared and be safe to limit the likelihood and impact of a major bushfires.

## October heat records

October has been warmer than average for much of grain-growing Australia. The warm temperatures have pushed us into a sooner than expected harvest and are contributing to increased fire risks for the summer period. These warmer temperatures could be linked with the developing El Nino-like conditions. For more information on the El Nino patterns you can head to www.bom.gov.au/climate/enso/

Upskilling to understand climate influences and seasonal weather patterns can be a very important investment for you and your farming business. WANTFA can help you to learn more about the climate pressures facing your farm as part of the Carbon Farming Extension and Outreach project.




Maximum temperature anomalies for October 2014 based on the 1961-1990 long term average. Source: Australian Bureau of Meteorology

# WANTFA's Long Term Cropping Systems and Soils Day

**Lauren Celenza, WANTFA Extension Manager**

Around 50 people came to the Long-term Cropping Systems and Soils Day, which for the first time was a separate event from the main Spring Field Day. Yvette Oliver from CSIRO spoke about the ins and outs of soil water, how to measure it and the links to other soil properties (including soil organic matter content). WANTFA Extension Officer Nikki Dumbrell put together a mini carbon farming workshop with some specialist researchers and extension agents. The guest speakers were DAFWA's Liam Ryan and UWA researcher Assoc/Prof Louise Barton and WANTFA's Matt McNee. Liam was able to shed light on the requirements and timescales necessary to build soil organic carbon levels, the benefits of building soil organic carbon stocks and how to set realistic expectations for sequestering carbon in your soils based on soil type and climate conditions. Louise Barton gave an update on research looking at the link between increasing

soil carbon and nitrous oxide emissions. The key outcomes and implications of this research are outlined in the next article of this newsletter, “Does increasing soil organic carbon in sandy soils increase soil nitrous oxide emissions from grain production?”.

Matt McNee showcased one of his Action on the Ground trials in place at the WANTFA long term trial site in Cunderdin. This trial is demonstrating a precision placement approach for applying organic materials to cropping soils. Small and large amounts of composted manure pellets have been applied to the soil on the same sowing lines each year, to create fertile zones around plant roots and improve plant growth. Additional plant growth, particularly better root growth, could potentially result in higher soil organic matter and more carbon sequestration. A major driver for the precision approach is to save on costs of the organic materials. The project will finish in June 2015 so, you can expect full results to be delivered to you through the WANTFA *New Frontiers in Agriculture* Journal, this newsletter and field days next year.

More information on the benefits of stubble retention for carbon storage and total organic carbon storage potential for West Australian soils can be found at[www.soilquality.org.au](http://www.soilquality.org.au)

Lyn Abbott and Louise Barton of UWA, Liam Ryan of DAFWA, Nikki Dumbrell of WANTFA and Guy Boggs from Wheatbelt NRM at the Long-term Cropping Systems and Soils Day in September (Photo: Lauren Celenza)

# Does increasing soil organic carbon in sandy soils increase soil nitrous oxide emissions from grain production?

**Louise Barton[1], Dan Murphy[1], Frances Hoyle[2]**

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## Aim

To investigate if increasing soil organic carbon increases $N_2O$ emissions and grain yield.

## Background

Increasing soil organic carbon is promoted as a strategy for sequestering carbon dioxide ($CO_2$) and mitigating anthropogenic greenhouse gas (GHG) emissions. Increasing soil carbon can benefit crop productivity; however, there is a risk that it may also enhance emissions of another potent GHG, nitrous oxide ($N_2O$). Understanding how increasing soil carbon effects soil $N_2O$ emissions and crop production is needed when assessing the suitability of soil carbon sequestration for abating GHG emissions. The effect of increasing soil carbon on $N_2O$ emissions from sandy-textured soils in Australia's rain-fed cropping regions is poorly understood. Consequently the overall objective of this project is to investigate if increasing the soil carbon alters $N_2O$ emissions and grain yield from crop production in the Western Australian grainbelt.

## Methods

We are investigating if increasing soil organic carbon alters soil $N_2O$ emissions at the Liebe Group's Long Term Research Site at Buntine. The site was established in 2003, and includes a variety of replicated treatments aimed to alter soil organic carbon. The current study is utilising field plots that have either been tilled annually with or without the addition of organic matter (OM) every three years. In May 2011, the OM+tillage plots contained 1.2% C in the surface 100 mm, while the Tillage treatment contained 0.5% C. Two blocks (Tillage, OM+Tillage) have been divided into six plots, with half the plots in each block receiving no nitrogen (N) fertiliser and the remaining plots receiving N fertiliser each year.

Plots were planted to canola (*Brassica napus* cv CBWA Telfer) on the 6 June 2012, and barley (*Hordeum vulgare* cv Hindmarsh) on 5 June 2013. Plots received 40 kg $ha^{-1}$ of triple superphosphate inserted to a soil depth of 30 mm at planting in 2012 and 2013. Half the plots in each OM treatment then received a surface application of urea (100 kg N $ha^{-1}$) four weeks after seeding (10 July 2012, 3 July 2013). The N fertiliser application rate was greater than that applied by growers in the district so as provide the greatest potential for $N_2O$ emissions.

Soil $N_2O$ emissions will be measured for approximately 2.5 years, and commenced 6 June 2012 following seeding. Emissions are measured using soil chambers (one per plot) connected to a fully automated system that measures $N_2O$ emissions using gas chromatography. Chambers (500 mm x 500 mm in area) made of clear Perspex are placed on metal bases inserted into the ground. The chamber height is progressively increased to accommodate crop growth, with a minimum height of 150 mm and a maximum height of 900 mm. Four bases are located in each treatment plot to enable the chambers to be moved to a new position every week so as to minimise the effect of chambers on soil properties and crop growth. In addition, grain yield is estimated at harvest each year by collecting hand-cuts collected from each treatment.

**Key results**

*Nitrous oxide emissions*

Increasing soil carbon in a Western Australian sandy soils has increased soil $N_2O$ emissions, however these losses are relatively insignificant and represent 0.1% of the N fertiliser applied.

Total $N_2O$ losses after two years were ranked: OM+tillage, plus N fertiliser (413 g $N_2O$-N $ha^{-1}$) > OM+tillage, no N fertiliser (203 g $N_2O$-N $ha^{-1}$) = Tillage, plus N fertiliser (41 g $N_2O$-N $ha^{-1}$) = Tillage, no N fertiliser (11 g $N_2O$-N $ha^{-1}$). These values are modest relative to those reported for other cropping systems in Australia and overseas.

**Grain Yield and Quality**

Increasing soil carbon in a sandy-textured soil increased grain yield by up to 40% in the present study, even when rainfall was below average. In 2012, canola grain yield was greater for the OM+tillage (1.53 t $ha^{-1}$) than the Tillage (1.09 t $ha^{-1}$) treatment. Similarly in 2013, barley grain yield was greater for the OM+tillage (3.95 t $ha^{-1}$) than the Tillage (3.14 t $ha^{-1}$) treatment. Increasing soil carbon also improved malting barley grain quality by minimising screenings and ensuring grain protein standards were met. Our findings are consistent with independent observations

made by Liebe Group since 2003.

**Implications**
Land management practises that increase soil carbon in Western Australia's sandy cropping soils should be encouraged. Although increasing soil carbon in Western Australia's sandy soils is likely to increase soil $N_2O$ emissions, these losses are relatively insignificant. At the same time, growers should be encouraged to modify N fertiliser inputs to reflect changes in plant available N resulting from improvements in soil carbon content. Such practices have the potential improve grain yield and profitability from sandy-textured soil, while minimising soil $N_2O$ emissions.

# A carbon farming policy update

On 31 October 2014, the Carbon Farming Initiative Amendment Bill 2014 was passed by the Senate. The Bill will take effect once passed by the House of Representatives as amended. This will establish the Emissions Reduction Fund (ERF). The Emissions Reduction Fund is the centre piece of the Direct Action Plan.
The ERF expands and improves on the tried and tested approach taken by the CFI to reduce emissions and improve the environment in the land sector. Under the CFI the rules to participate were called methodologies and they could be developed by anyone. Under the ERF they are called methods and can only be developed by government.
The ERF expands the coverage of the existing CFI to include the rest of the economy. It supports emissions reductions from energy efficiency, waste coal mine gas, cleaning up power stations, the transport sector and large industrial facilities. It will also continue to support emissions reductions from the land sector, and existing CFI projects will automatically be registered under the programme.
The ERF could give farmers more opportunities to reduce their greenhouse gas emissions.
If a farmer or land manager already has a project already registered with the CFI it will automatically be registered with the ERF.

When we have new legislation we will be sure to provide an update on what it means for you, in the meantime you can find more information at the following websites:

1. Further details of the ERF design, including information about methods—the rules that set out how to estimate the emissions reduction from an approved activity—is at: www.environment.gov.au/emissions-reduction-fund.
2. Any detailed operational question (pre-registration, how the Fund will operate, the role of the Clean Energy Regulator, types of projects, auctions, how the CFI fits with the ERF) can be found at: cleanenergyregulator.gov.au (select the Emissions Reduction Fund tab).
3. To follow the development of new ERF methods go to:http://www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/methodologies

## Do you remember Bill Long's Wild Radish song?

Bill has written another farm related song titled "The Carbon Resolution". The video clip of this will be launched on YouTube on Monday 17 November 2014. Follow @billlong4 or @AgConsulting_Co on Twitter and use #carbonresolution and like the Facebook page at www.facebook.com/TheLongPaddockProductions. The page is designed to create more awareness of the Carbon Farming Initiative and what farmers can do to have an impact… So, … check it out and share it with your friends!

## 2015 has been declared as the International Year of Soils

Soils are an important resource underpinning ecosystem functions, biodiversity, water filtration processes and groundwater recharge, **efforts to adapt to and mitigate climate change**, efforts to increase agricultural production, etc etc.

As well as having 2015 as the International Year of Soils, **Friday 5 December every year is World Soil Day**.
The objectives of the International Year of Soils 2015 set out by the 68th United Nations General Assembly are to:

- Raise full awareness among civil society and decision makers about the profound importance of soil for human life;
- Educate the public about the crucial role soil plays in food security, climate change adaptation and mitigation, essential ecosystem services, poverty alleviation and sustainable development;
- Support effective policies and actions for the sustainable management and protection of soil resources;
- Promote investment in sustainable soil management activities to develop and maintain healthy soils for different land users and population groups;
- Strengthen initiatives in connection with the Sustainable Development Goals process and Post-2015 agenda;
- Advocate for rapid capacity enhancement for soil information collection and monitoring at all levels (global, regional and national).

You can watch the promotional video for the International Year of Soils that highlights the importance of this precious resource on YouTube here: http://www.fao.org/soils-2015/en/



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